Manitoba

Agriculture

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Swine Facts

Swine Rations

Many swine producers prepare their feed using on-farm milling and mixing equipment. To do so accurately and efficiently, a ration formulation (i.e. recipe) for each feed is needed. A recent survey conducted by Manitoba Agriculture showed, however, that a significant number of the producers surveyed did not know the formulation of the feed in question.

Different classes of pigs have unique dietary requirements for optimum performance. Producers can provide their pigs with a balanced ration through the use of either:

1. commercially prepared complete feeds
2. commercial supplements added at the appropriate rate to cereal grains
3. mineral-vitamin premixes added together with a supplemental protein source to cereal grains.

Complete Feeds

A complete feed is designated to meet all the nutrient requirements of a certain class of pig without additional supplementation. Because of the complexity and high nutrient density required in pre-starter and starter diets, producers often purchase complete, commercially prepared feeds for these two classes of swine. They also eat very little and therefore any cost savings by preparing the feed on-farm are minimal.

Supplements

A commercial protein supplement contains the additional protein, minerals and vitamins not supplied in sufficient quantity by grain alone. When the protein supplement is mixed with an energy source (grain), at the level recommended by the feed manufacturer, a balanced ration is produced.

Supplements are often described by their protein content (eg. a 40 per cent supplement contains 40 per cent crude protein). Addition rates will vary between supplements, depending upon the nutrient concentration and the class of pig being fed. **Producers should follow closely the recommendations of feed companies for the use of particular products.** Unless otherwise indicated, supplements should not be used interchangeably between various classes of pigs. For example, a hog finisher supplement will provide sufficient protein for most sows, but may not provide adequate calcium and phosphorus, if added at the recommended rate.

Various grains can be mixed with a supplement to form a balanced ration. Producers should refer to the Swine Facts "Energy Sources for Swine" for guidelines on the recommended addition rates of grains and other energy sources.

Swine Premix (Base Mix)

A premix contains minerals, vitamins and sometimes, feed additives. When it is mixed on-farm with a protein source (soybean meal, canola meal etc.) and an energy source (eg. barley), a balanced ration is formed. Premixes are commonly added to a feed at the rate of 2.5 to 5 per cent depending primarily upon the class of swine being fed.

Grower and finisher premixes are commonly added at the lower rate because of the relatively low levels of calcium and phosphorus required in the complete mixed feed. The higher calcium and phosphorus requirements of starter pigs and sows and the use of additional ingredients, such as chemical laxatives in sow diets and flavors and medication in starter diets, result in a higher addition rate of these premixes.

To prevent deficiencies or toxicities from occurring, **it is important that premixes be added to the feed at the level recommended by the manufacturer.** The sample rations listed are based on two addition rates — 2.5 and 5 per cent. Always follow the addition rate recommended by the manufacturer if it differs from these rates.

Feed Ingredient Composition

Average values for digestible energy (DE), crude protein, calcium, phosphorus and lysine are presented in Table 1 for the feedstuffs used in the sample rations listed. Remember, however, that feedstuffs will vary in nutrient content. When it is known that the nutrient content of a particular feedstuff differs considerably from that shown in Table 1, the appropriate adjustments should be made in the suggested rations. Seek professional advice when making such adjustments.

Sample Ration Formulations

The following rations are based on two mineral-vitamin premixes 1. a 22 per cent calcium: 10 per cent phosphorus premix with an addition rate of 5.0 per cent and 2. a 24 per cent calcium: 8 per cent phosphorus premix with an addition rate of 2.5 per cent. These premixes do not contain synthetic lysine. If the premix you are feeding contains synthetic lysine, the amount of supplemental protein can be reduced and added according to the instructions on the feed tag.

Sample formulations for supplement-based rations are not included because it is not possible to provide digestible energy and lysine estimates for these rations.

These are general guidelines for swine rations and may not fit every situaiton. For example, lactating sows suffering excessive body weight loss may require a higher energy diet than any of those shown. Custom rations are available through Manitoba Agriculture nutritionists and swine extension staff as well as feed company nutritionists.

All rations will provide balanced nutrition but producers should determine for themselves both the relative costs and suitability of the various diets.

Nutrient Analysis

Rations were formulated to provide the minimum required levels of lysine and crude protein. All rations also provide sufficient levels of the remaining essential amino acids. In some cases, higher lysine levels than those listed may be required (eg. where feed intake is restricted). Such rations will contain synthetic lysine or additional supplemental protein. Consult a professional nutritionist for the appropriate formulations.

Digestible energy levels vary from ration to ration depending on the feed ingredients used. Producers wishing to increase rate of gain in feeder pigs or improve sow body condition, should choose rations which provide a higher energy level.

Table 1.
Average nutrient content of common feedstuffs (as fed basis)*

	% Dry Matter	kcal digestible energy/kg	% crude protein	% lysine	% calcium	% phosphorus
Barley	88	3,110	11.9	0.39	0.04	0.34
Wheat	89	3,270	14.2	0.37	0.04	0.37
Corn	89	3,400	9.6	0.25	0.03	0.26
Oat Groats	90	3,720	15.8	0.53	0.08	0.43
Oats	89	2,830	11.8	0.39	0.07	0.33
44% Soybean Meal	89	3,320	44.6	2.68	0.30	0.63
47.5% Soybean Meal	90	3,940	47.5	3.17	0.26	0.63
Canola Meal	91	2,880	37.0	1.98	0.71	1.00
Field Peas	89	3,350	22.5	1.54	0.14	0.39
Fababeans	87	3,400	28.0	1.85	0.11	0.42
Alfalfa Meal	92	1,420	17.3	0.85	1.40	0.23
Bran	89	2,410	15.2	0.58	0.11	1.22
Beet Pulp	91	2,930	8.8	0.60	0.63	0.09
Dried Skim Milk	94	3,870	33.7	2.53	1.28	1.02
Dried Whey**	93	3,190	13.3	0.94	0.86	0.76
Tallow	100	8,100	—	—	—	—

**Adapted from United States — Canadian Tables of Feed Composition. National Research Council. Third revised edition, 1982.*

***Dried whey should be low lactose, food grade quality.*

Table 2
Suggested rations for baby pigs, 10-25 lbs. (4.5-11 kg) liveweight.

	1	2	3	4	5	6	7
				— kg/tonne —			
Wheat	665	615	475	—	515	615	635
Corn	—	—	—	615	—	—	—
Oat Groats	—	—	200	—	—	—	—
44% Soybean Meal*,**	—	200	—	—	—	135	—
47.5% Soybean Meal*	200	—	200	200	200	—	115
Dried Whey	—	—	—	—	200	—	—
Dried Skim Milk	85	135	75	135	35	200	200
Premix	50	50	50	50	50	50	50
TOTAL (kg)	1000	1000	1000	1000	1000	1000	1000

**Soybean meal levels above 20% may cause scouring.*

***Note that the use of 44% soybean meal, instead of 47.5% soybean meal, lowers the digestible energy content of the baby pig diet.*

NUTRIENT ANALYSES

% lysine	1.10	1.10	1.10	1.13	1.10	1.10	1.10
kcal DE/kg	3,290	3,190	3,370	3,400	3,240	3,230	3,300
% calcium*	1.29	1.35	1.28	1.35	1.39	1.42	1.42
% phosphorus*	.96	.99	.96	.93	1.00	1.02	1.01
% crude protein	21.9	22.2	21.9	20.0	20.6	21.4	21.2

**Assumes premix contains 22% calcium and 10% phosphorus.*

Table 3
Suggested rations for starting pigs, 25-55 lbs. (11-25 kg) liveweight.

	1	2	3	4	5	6
			— kg/tonne —			
Wheat	685	735	485	—	540	670
Barley	—	—	250	—	—	—
Corn	—	—	—	695	—	—
44% Soybean Meal*	200	—	—	—	210	205
47.5% Soybean Meal*	—	215	200	200	—	—
Dried Whey	—	—	—	—	200	—
Dried Skim Milk	65	—	15	55	—	—
Canola Meal	—	—	—	—	—	75
Premix	50	50	50	50	50	50
TOTAL (kg)	1000	1000	1000	1000	1000	1000

**Soybean meal levels above 20% may cause scouring.*

NUTRIENT ANALYSES

% lysine	0.95	0.95	0.95	0.95	0.95	0.95
kcal DE/kg	3,150	3,250	3,210	3,360	3,100	3,090
% calcium*	1.27	1.19	1.20	1.25	1.36	1.24
% phosphorus*	.95	.91	.91	.86	.98	.95
% crude protein	20.8	20.5	19.9	18.1	19.7	21.5

**Assumes premix contains 22% calcium and 10% phosphorus.*

Table 4
Suggested rations for growing pigs, 55-130 lbs (25-60 kg) liveweight.

	1	2	3	4	5	6	7
				— kg/tonne —			
Barley	835	—	850	—	805	740	765
Wheat	—	830	—	—	—	—	—
Corn	—	—	—	785	—	—	—
44% Soybean Meal	140	145	—	190	70	85	60
47.5% Soybean Meal	—	—	125	—	—	—	—
Canola Meal	—	—	—	—	100	—	—
Field Peas	—	—	—	—	—	150	—
Fababeans	—	—	—	—	—	—	150
Premix	25	25	25	25	25	25	25
TOTAL (kg)	1000	1000	1000	1000	1000	1000	1000
NUTRIENT ANALYSES							
% lysine	0.70	0.70	0.72	0.71	0.70	0.75	0.74
kcal DE/kg	3,060	3,190	3,130	3,300	3,020	3,080	3,090
% calcium*	0.68	0.68	0.67	0.68	0.72	0.68	0.67
% phosphorus*	0.57	0.60	0.57	0.52	0.62	0.56	0.56
% crude protein	16.2	18.3	16.0	16.0	16.4	16.0	16.0

** Assumes premix contains 24% calcium and 8% phosphorus.*

Table 5
Suggested rations for finishing pigs, 130 lbs. (60 kg) liveweight to market.

	1	2	3	4	5	6	7	8	9
					— kg/tonne —				
Barley	880	895	—	—	840	750	825	845	820
Wheat	—	—	870	—	—	—	—	—	—
Corn	—	—	—	830	—	—	—	—	—
44% Soybean Meal	95	—	105	145	15	—	—	100	105
47.5% Soybean Meal	—	80	—	—	—	—	—	—	—
Canola Meal	—	—	—	—	120	—	—	—	—
Field Peas	—	—	—	—	—	225	—	—	—
Fababeans	—	—	—	—	—	—	150	—	—
Tallow*	—	—	—	—	—	—	—	30	50
Premix	25	25	25	25	25	25	25	25	25
TOTAL (kg)	1000	1000	1000	1000	1000	1000	1000	1000	1000
NUTRIENT ANALYSES									
% lysine	0.60	0.60	0.60	0.60	0.60	0.64	0.60	0.60	0.60
kcal DE/kg	3,050	3,100	3,190	3,300	3,010	3,080	3,080	3,200	3,300
% calcium*	0.66	0.66	0.67	0.67	0.72	0.66	0.65	0.66	0.66
% phosphorus*	0.56	0.56	0.59	0.51	0.61	0.54	0.54	0.55	0.55
% crude protein	14.7	14.4	17.0	14.5	15.0	14.0	14.0	14.5	14.4

**The use of tallow is recommended in rations with low bushel weight (i.e. low energy) cereal grains.*

**Assumes premix contains 24% calcium and 8% phosphorus.*

Table 6
Suggested rations for pregnant sows.

	1	2*	3	4	5	6	7	8	9**	10**
					— kg/tonne —					
Barley	915	—	415	920	795	900	880	895	825	820
Oats	—	—	500	—	—	—	—	—	—	—
Wheat	—	905	—	—	—	—	—	—	—	—
44% Soybean Meal	35	45	35	—	5	—	—	—	25	30
47.5% Soybean Meal	—	—	—	30	—	—	—	—	—	—
Alfalfa Meal	—	—	—	—	150	—	—	—	—	—
Canola Meal	—	—	—	—	—	50	—	—	—	—
Field Peas	—	—	—	—	—	—	70	—	—	—
Fababeans	—	—	—	—	—	—	—	55	—	—
Bran	—	—	—	—	—	—	—	—	100	—
Beet Pulp	—	—	—	—	—	—	—	—	—	100
Premix	50	50	50	50	50	50	50	50	50	50
TOTAL (kg)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
NUTRIENT ANALYSES										
% lysine	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.46
kcal DE/kg	2,960	3,110	2,820	2,980	2,700	2,940	2,970	2,970	2,890	2,940
% calcium*	1.15	1.15	1.16	1.14	1.34	1.17	1.15	1.14	1.15	1.21
% phosphorus*	0.83	0.86	0.83	0.83	0.81	0.86	0.83	0.83	0.92	0.81
% crude protein	12.4	14.8	12.4	12.3	12.3	12.6	12.0	12.2	12.5	12.0

**Daily intake of ration 2 should be reduced if sows are becoming fat.*

*** Rations 9 and 10 might help prevent constipation.*

**Assumes premix contains 22% calcium and 10% phosphorus.*

Table 7
Suggested rations for lactating sows.

	1	2	3	4	5	6	7	8*	9*	10	11
	— kg/tonne —										
Barley	850	—	865	—	815	695	815	805	805	815	790
Wheat	—	840	—	—	—	—	—	—	—	—	—
Corn	—	—	—	800	—	—	—	—	—	—	—
44% Soybean Meal	100	110	—	150	15	—	35	95	95	105	110
47.5% Soybean Meal	—	—	85	—	—	—	—	—	—	—	—
Canola Meal	—	—	—	—	120	—	—	—	—	—	—
Field Peas	—	—	—	—	—	255	—	—	—	—	—
Fababeans	—	—	—	—	—	—	100	—	—	—	—
Bran	—	—	—	—	—	—	—	50	—	—	—
Beet Pulp	—	—	—	—	—	—	—	—	50	—	—
Tallow	—	—	—	—	—	—	—	—	—	30	50
Premix	50	50	50	50	50	50	50	50	50	50	50
TOTAL (kg)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
NUTRIENT ANALYSES											
% lysine	0.60	0.60	0.60	0.60	0.60	0.66	0.60	0.60	0.60	0.60	0.60
kcal DE/kg*	2,970	3,110	3,020	3,220	2,930	3,010	2,990	2,940	2,960	3,120	3,230
% calcium**	1.16	1.17	1.16	1.17	1.22	1.16	1.15	1.17	1.19	1.16	1.16
% phosphorus**	0.85	0.88	0.85	0.80	0.91	0.84	0.84	0.90	0.84	0.84	0.84
% crude protein	14.6	16.8	14.2	14.3	14.9	14.0	14.1	14.6	14.3	14.4	14.3

Rations 8 and 9 might help prevent constipation.

***Producers should pick higher or lower energy diets depending on the body condition and appetite of the sows.*

***Assumes premix contains 22% calcium and 10% phosphorus.*

Related Publications

Manitoba Agriculture Swine Facts
- Nutrient Requirements of Swine
- Protein and Amino Acid Sources for Swine
- Energy Sources for Swine

References

Luce, W.G., G.R. Hollis, D.C. Mahan and E.R. Miller. Swine Rations, Pork Industry Handbook; West Lafayette, Indiana, U.S.A.

United States-Canadian Tables of Feed Composition. National Research Council, National Academy Press, Washington, D.C. 3rd revised edition, 1982.

Froese, C., D. Hodgkinson, and K. Dupchak. A field survey on calibration of electric proportioner hammer mills. Proceedings of the 1986 Animal Industry Conference, Winnipeg, 1986.

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